



U.S. DEPARTMENT OF
ENERGY

Nuclear Energy

Nuclear Energy Enabling Technologies (NEET) Advanced Sensors and Instrumentation (ASI)

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Advanced Sensors and Instrumentation

■ Vision

Develop advanced sensors and instrumentation technologies that address critical technology gaps for monitoring and controlling advanced reactors and fuel cycle facilities

■ Goal

To provide crosscutting research that:

- Contributes to the success of the DOE-NE R&D programs
- Supports common I&C technology development needs
- Overcomes current and future I&C barriers to nuclear energy system deployments

A new model of I&C innovative RD&D to overcome nuclear power's impediments to new I&C technology usage

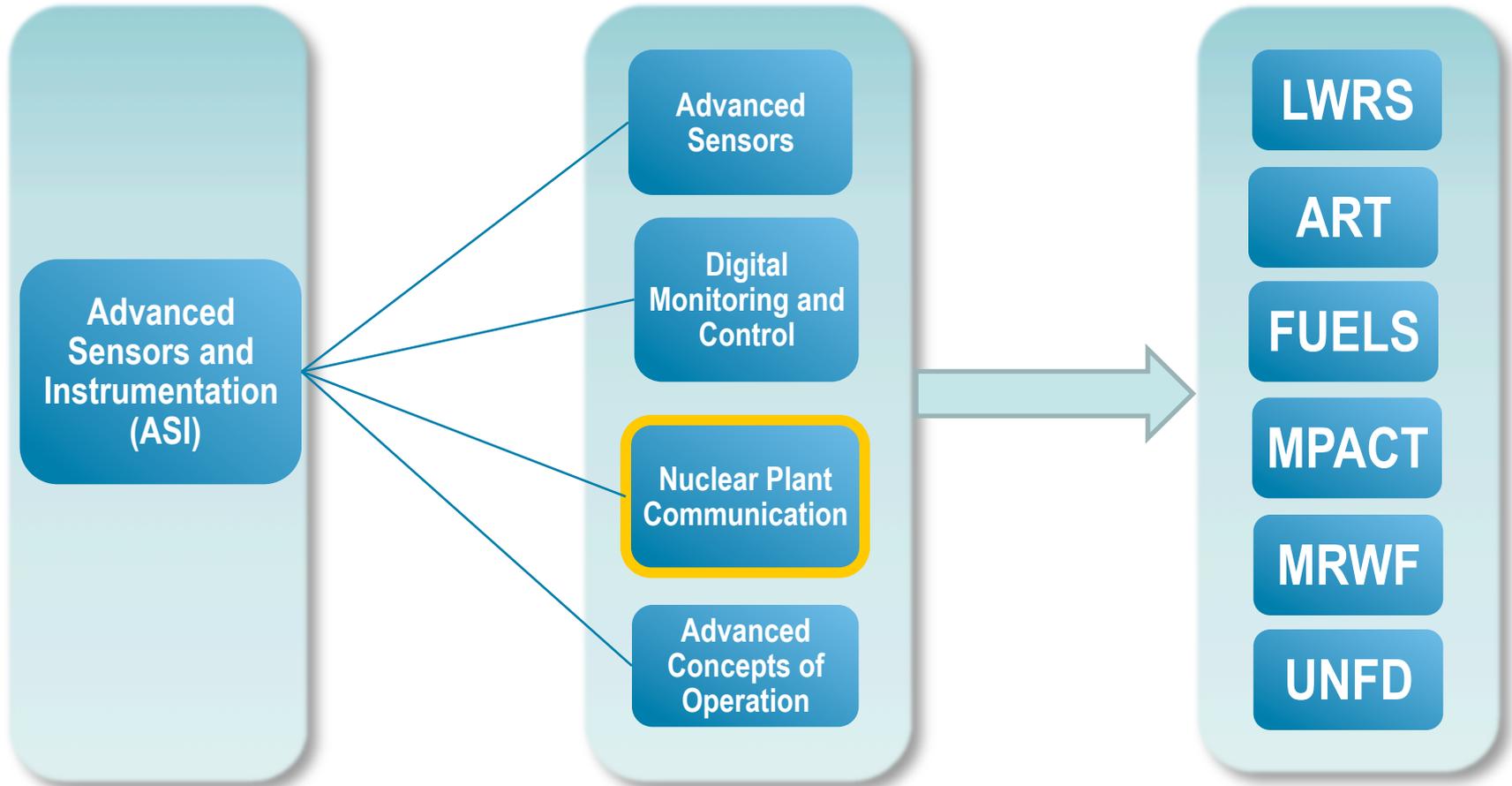


ASI Program Areas

NEET Program

...divided into...

R&D Topics ...target gaps in support of... NE R&D Programs Needs



[LWRS-Light Water Reactor Sustainability; ART-Advanced Reactor Technologies; Fuels -Advanced Fuels; MPACT-Materials Protection, Accounting and Control Technology; MRWF- Material Recovery and Waste Form Development; UNFD-Used Nuclear Fuel Disposition]

NEET- 2 ASI FOA TOPIC: Advanced Communication Technology for Nuclear Environment

Challenge: Develop and demonstrate innovative robust methods for transmitting signals and data in a nuclear environment that is applicable to multiple reactors or fuel cycle applications

Research objectives:

- develop and demonstrate the ability to transmit **greater amounts of data** and other signals **through physical boundaries** in nuclear facilities
- address **new communication demands** needed for advanced measurement and control technologies **including protection of data**
- take into consideration the **environment** and the conditions under regular operation and/or accident scenario
- **test and validate prototype through demonstration** in appropriate representative environment



Examples of Desired Outcomes

■ Overcome Current Limitations in today's 'wired' systems

- Reduce lifecycle system costs, such as capital, installation, maintenance, inspection, tests, etc. when compared with today's 'wired' systems
- Reduce or eliminate need for wired sources of power through onboard power sources such as long lived batteries, energy scavenging, etc.

■ Increase throughput of data

- Eliminate point-source limited data systems in current control systems via modern communication technologies that are better integrated with instrumentation, information, and control systems
- Support more advanced future digital architectures needed to achieve a secure, seamless digital environment for nuclear energy systems

■ Be environmentally compliant

- Be capable of meeting requirements of EMI and RFI for sensitive nuclear applications
- Some classes of technologies needed to function in harsh environmental conditions typical of nuclear power plant environments (e.g., DBAs)



Summary of ASI Proposals Expectations

- Research will improve and advance **ASI technologies** to
 - enable advances in nuclear reactor and fuel cycle system development
 - enhance economic competitiveness for nuclear power plants, and
 - promote a high level of nuclear safety.
- Organizations performing this research will be expected to produce concepts, techniques, capabilities, and equipment that are or can be **demonstrated in simulated or laboratory test bed environments** representative of nuclear plant applications.
- Successful applications will describe **truly innovative and crosscutting** sensors and instrumentation that offer the potential for **revolutionary gains** in reactor and fuel cycle performance and that can be applied to **multiple reactor designs and fuel cycle concepts**.

I&C technologies are a vital key to enabling the expansion of clean, safe and economical nuclear power.

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